## REMARKS/ARGUMENTS

The examiner has objected to the last amendment filed by the applicants as containing "new matter" as defined under 35 U.S.C. §132(a). In particular, the examiner has argued that the newly added claims 38 and 43 include new matter, and reprints, verbatim, a large excerpt of the text from these claims. In this reprint, the examiner places in italics the term "a plurality of cells of equal size and shape," apparently for emphasis, but it is not clear whether this is the only portion of the excerpt that she considers to be new matter. Thus, this response will address itself to all of the text reprinted by the examiner. In addition, the examiner has stated that:

> [t]he specification simply fails to disclose that the pixels are arranged into a plurality of cells each cell with hexagonal shape with the detailed structures stated above. The specification never gives any disclosure concerning the geometric shape of the pixel cells. The specification although discloses "dark separation lines" between cells, this does not mean the dark separation lines equals to the cell geometric shape.

In the sense that there is some claim language for which there is no corresponding *text* in the specification, the examiner is correct. However, the application as a whole clearly discloses the subject matter of the newly added claims, as is described in more detail below.

The language of the claims that was excerpted by the examiner refers to a claim limitation for "providing an image on a substrate of sufficient transparency to allow light therethrough," and describes the image as follows:

> comprising a plurality of interspersed views made up of pixels organized in a plurality of cells of equal size and shape each of which contains image information corresponding to a predetermined range of views for a region of the image in which the cell is located, each cell being substantially hexagonal with a maximum height in a first direction that is centered relative to the cell and that, in a second direction perpendicular to the first direction, tapers continuously to a minimum height at the extremes of the cell, each cell being contiguous with at least one adjacent cell in the second direction so as to together form one of a plurality of cell rows, said cell rows lying adjacent to each other in the first direction with cell positions being staggered in the second direction from one row to an

> adjacent row such that a maximum cell height in a first row aligns substantially with a minimum cell height in an adjacent row, and cells in adjacent rows lie partially adjacent to each other in the second direction...

This description will be taken one section at a time. The except begins by describing an image "comprising a plurality of interspersed views..." The first sentence of paragraph [34] of the application as filed states that "[t]he invention relates to a method and an apparatus for creating fixed high-quality, high-definition, color "real" 3-D illustrations *having multiple auto-stereo views*." Thus, the concept of an image having multiple views was clearly disclosed. How these views are arranged and perceived by a viewer is very clearly shown, for example in Figure 3, which also makes it very clear that the different views are "interspersed" on the image (the first definition of "intersperse" from the *The American Heritage® Dictionary of the English Language: Fourth Edition, 2000* is: "1. [t]o distribute among other things at intervals: *interspersed red and blue tiles on the walls; intersperse praise with constructive criticism*.").

The next portion of the cited claim language states that the views are: "made up of pixels organized in a plurality of cells of equal size and shape." Paragraph [0033] of the specification states that "[t]he image used is made up of a plurality of cells, each cell being composed of a plurality of pixels." Thus, this claim limitation is also clearly supported by the original disclosure. Continuing, the excerpt recites that each cell "contains image information corresponding to a predetermined range of views for a region of the image in which the cell is located." As shown in Figure 3, when a viewer is receiving information passing through a given slit, the information is different depending on the point of view (*i.e.*, the position of the viewer's eye). As stated in paragraph [0040], "a relationship is created between the points of view 10a to 10d and the corresponding information 9a to 9d on the computer-processed image 2." The range of views shown in the figure is correlated to a range of views for the cell being viewed. Thus, the concept of the cell containing image information "corresponding to a predetermined range of views" for that region of the image is clearly supported.

The claim language that follows in the above excerpt was particularly noted by the examiner, and refers to "each cell being substantially hexagonal with a maximum height in a first direction that is centered relative to the cell and that, in a second direction perpendicular to the first direction, tapers continuously to a minimum height at the extremes of the cell..." The examiner is correct in the sense that this exact *text* was not present in the application as filed. However, for making a determination of whether new matter exists, it is necessary to consider all portions of the application as filed, including the drawings (an applicant shows possession of the claimed invention by describing the claimed invention with all of its limitations using such descriptive means as words, structures, figures, diagrams, and formulas that fully set forth the claimed invention. *Lockwood v. American Airlines, Inc.*, 107 F.3d 1565, 1572, 41 USPQ2d 1961, 1966 (Fed. Cir. 1997)). As this claim language defines the shape and layout of cells in the image, it is therefore instructive to examine Figure 7 of the application, which provides a visual representation of the image cells.

Figure 7 of the applicants' disclosure depicts three rows of cells of the image. Paragraph [0052] states that "[a] rippled opaque line 45 (FIG. 7) is drawn on the top and bottom of each slit 21 along a horizontal row of cells, thus separating and/or isolating the rows of cells from each other." As indicated in the figure, each cell is aligned with one slit, so that "the information coming through a given slit in a slit-type barrier screen comes from only one cell and not from any adjacent cell," as noted in paragraph [0034] of the applicants' specification. This characteristic of one aperture per cell is very clearly described in other parts of the original disclosure as well, such as paragraph [0069] and original Claim 17. There is no doubt that one skilled in the art would understand that each aperture is centered on one cell of the image, as is shown in Figure 7.

Figure 7 of the original disclosure also clearly shows the shape of the cells. The "rippled opaque lines" are used to provide a separation between the rows of cells in a vertical direction, as discussed in paragraph [0052]. This paragraph further states that "[t]his feature eliminates the vertical distortions perceived when the viewer observes the

3D image past a certain vertical angle." As is quite apparent to the reader, the lines thus provide borders between the rows of cells so as to limit "image bleeding between the cells" that might otherwise occur since the cells immediately above and below a particular cell contain completely different information that might accidentally be perceived if the vertical viewing angle was too great.

Since the views of the image are arranged in a horizontal manner, no such dark line border is used to separate the cells adjacent to one another in the horizontal direction. However, the shape of the cells is nonetheless quite visible in Figure 7. As the rows are separated from one another by the dark lines 45, it is easy to see that each cell has a maximum vertical dimension at the center of the cell, which tapers to a minimum at the horizontal extremes of the cell (*i.e.*, where it meets an adjacent cell). The apertures 21 are centered on the cells, and therefore align with the maximum vertical dimension. There is no line drawn on the image to show the separation of one cell from a horizontally adjacent cell, but there can be little doubt from the context of the disclosure that this separation is along a vertical line. This is also shown from the top view of Figure 8, in which vertical grooves are used at the horizontal extremes of the cells to separate them. However, whether or not such grooves are used, those skilled in the art will clearly recognize the horizontal limit of each cell as being along a vertical line, and will understand with no difficulty that the overall shape of each cell is therefore hexagonal.

The word "hexagonal" was not used in the applicants' specification as originally filed. However, there could be no doubt in the minds of those skilled in the art as to the shape of the cells, since they are clearly depicted as hexagons in the figures. Thus, the description in the claims of each cell "being substantially hexagonal with a maximum height in a first direction that is centered relative to the cell and that, in a second direction perpendicular to the first direction, tapers continuously to a minimum height at the extremes of the cell" is simply a way of putting into words that which is unambiguously shown in the drawing figures. With the "first direction" representing the vertical direction in Figure 7, it is clear that each cell has a maximum height that is centered relative to the cell and that tapers along a second (*i.e.*, horizontal) direction to a minimum height at the extremes of the cell.

The remainder of the claim language cited as new matter by the examiner recites "said cell rows lying adjacent to each other in the first direction with cell positions being staggered in the second direction from one row to an adjacent row such that a maximum cell height in a first row aligns substantially with a minimum cell height in an adjacent row, and cells in adjacent rows lie partially adjacent to each other in the second direction." Figure 7 clearly shows that the cell rows lie adjacent to each other in the first direction and that the cell positions are staggered in the second direction from one row to an adjacent row. This, of course, accounts for the staggered positions of the apertures in the barrier screen. Since these staggered positions alternate from one row to the next, the maximum cell height in one row aligns in the horizontal direction with the minimum height in the adjacent rows, as is also easily seen in the figure.

The subject matter objected to by the examiner as being new matter was clearly present in the application as filed when taken in its entirety. However, to provide textual support in the specification for language used in the claims, the specification has been amended to incorporate some of the relevant terminology. Notably, the added language is no more than a description of what is already shown in the figures, and this added text is therefore not new matter. In particular, paragraph [0040] of the specification has been amended to include specific language referring to the cells each providing a range of interspersed views for their corresponding region of the image. As mentioned above, these concepts are apparent from the application as filed, but are being incorporated by amendment into the specification so as to provide textual correspondence for the claims, as amended. Similarly, paragraph [0052] has been amended to describe the features shown clearly in Figure 7. As each of the aspects of the invention described by the amendments to the specification was present in the original disclosure, no new matter has been added. Acceptance of these amendments is therefore respectfully requested.

For the reasons provided above, the claim amendments made in the applicants' last response do not constitute new matter, since features they describe were all easily discernible by one skilled in the art viewing the application as filed. It is therefore respectfully requested that the examiner, upon reviewing the details of the applicants' original disclosure in the context of the current claim language, reconsider this rejection, as it is believed that such a review, taken together with the points provided above, would demonstrate the sufficiency of the disclosure to support the earlier amendments. It is further respectfully requested that this objection be withdrawn or that any part of the language deemed unsupported be addressed in detail by the examiner.

Claims 38-49 were rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. In particular, the examiner has referenced her arguments made regarding the introduction of new matter as the basis for this rejection. However, for the reasons provided above, it is respectfully submitted that the application, as filed, contained ample disclosure of the subject matter being claimed. The amendments made herein to the specification provide a textual correlation between the specification and the claims without introducing any new concepts. As such, reconsideration of Claims 38-49 under this ground for rejection is respectfully requested.

Claims 38-49 were also rejected under 35 U.S.C. §112, first paragraph as failing to comply with the enablement requirement. In particular, the examiner has stated that the specification and claims "fail to disclose how the 'plurality of interspersed views' [are] made of pixels organized in a plurality of cells and each of the cells is hexagonal." The examiner goes on to state that "the specification fails to teach... how the auto-stereo three dimensional views [are] provided with the *hexagonal* cells and the barrier screen. That is to say the specification fails to disclose how the hexagonal cells of pixels corresponds with the openings or apertures of the barrier screen to provide right eye perspective views to right eye and left eye view perspective views to left eye" (emphasis original).

To the extent that the examiner's rejection is based on a question of the sufficiency of disclosure, these points have been addressed at length above. However, it appears from the examiner's comments that there may also be a misunderstanding of the actual manner in which the invention functions. Figure 3 of the application is instructive in understanding some of the basic principles of the invention. Four different points of view 10a, 10b, 10c, 10d are shown for a given aperture/cell combination. From each point of view, different information is visible through the aperture, the different information being labeled as 9a, 9b, 9c, 9d to correspond with the points of view indicated in the figure. Thus, as a point of view moves in a horizontal direction, the information viewable in a particular cell changes. Each of the pieces of information 9a-9d is a portion of one of the interspersed views that make up the image. In particular, it is the portion of that view that corresponds to that position in the image and which, therefore, is located in that cell.

The overall image contains a plurality of different views. For example, one of the views might be the representation of an object from a first viewing position. This view is broken up into different sections, each of which is located in a different one of the cells. Thus, when looking through a first aperture from the first viewing position, a viewer sees one specific section of the particular view in question. When looking through a different aperture from the same viewing position, the viewer sees a different section of that same view. If, however, the viewing position changes, the viewer looking through the first aperture will see information related to a different view. This information, however, while corresponding to a different view, still comes from the same cell that is viewable through the first aperture. Thus, within a single cell are pieces of many different views, namely, the pieces of those views that correspond to the position of that cell in the image. The pixels of the image are arranged in this way to make a plurality of cells (each corresponding to an aperture), and the different views interspersed in the image are each made up of multiple sections, each section being located in a different cell and, therefore, being viewable through a different aperture.

The different views that are interspersed in the image are selected so that the desired three-dimensional effect results when a user looks with both eyes. The manner of generating the desired views is described in detail in the specification, and would certainly be within the ability of one of ordinary skill in the art having read the disclosure. However, it is also important to note that the effect of interspersing different views on a cell-by-cell basis, and the shape of the cells and manner in which they are nested together are not dependent on any particular selection of views. Thus, the idea of a "right eye perspective view" and a "left eye perspective view" is not present in the claims falling under this rejection.

For the reasons provided above, it is believed that the applicants' disclosure clearly provides sufficient detail to enable one skilled in the art to understand and practice the invention. Reconsideration of Claims 38-49 under this ground for rejection is therefore respectfully requested.

The drawings were objected to under 37 C.F.R. 1.83(a), the examiner stating that the drawings do not show "a plurality of interspersed views made up of pixels organized in a plurality of cells... each cell being substantially hexagonal." However, as discussed in detail above, Figure 7 clearly shows the shape and configuration of cells for the present invention. Moreover, this figure in conjunction with others clearly shows how different interspersed views are present in the image (Figures 3, 8 and 9, for example) and may be perceived from different points of view. Thus, it appears unnecessary to make any drawing amendments in order to show these features, and no drawing amendments are being made herein. Notably, applicant is not seeking an abeyance of the examiner's request for new drawings but, rather, pointing out that no such drawing amendments appear to be necessary. As such, reconsideration of this basis for objection is respectfully requested. If the examiner deems it necessary to maintain this basis for objection, the applicants respectfully request a detailed explanation of how the present drawings are lacking, taking into account the points made above.

Claims 38-49 were rejected under 35 U.S.C. §103(a) as being obvious over U.S. Patent No. 5,935,148 ("Moseley") in view of U.S. Patent No. 5,949,390 ("Nomura"). This rejection was discussed extensively in the applicants' last response, and the substance of those arguments is therefore incorporated herein by reference. However, it appears that some fundamental differences between the prior art and the present invention should be highlighted.

The examiner states that the Nomura reference teaches an image made up of "a plurality of interspersed views made up of pixels organized into a plurality of cells of equal size and shape." She references several figures, the clearest example of this arguably being Figure 3B. In this figure, a rectangular region is shown having eight rectangular pixels 5. The examiner notes that Nomura "does not teach explicitly that each cell is of hexagonal shape," and goes on to state that "Moseley et al teaches that the pixels can assume many different geometric shapes, wherein one of them is hexagonal as shown in Figure 18." In particular, the examiner states that:

> Moseley et al teaches that the hexagonal shape of the pixels that tapers from the center to the extremes of the cell and the adjacent cells arranged into rows of pixels make the cross talk of the light lacking into viewing window from neighboring region or cell to be reduced (please see column 12, lines 1-19). It would then have been obvious to one skilled in the art to apply the teachings of Moseley et al to modify the geometric shape of the pixel-cells to assume hexagonal shape to reduce unwanted light leaking through the viewing window from neighboring window.

Several problems exist with the examiner's conclusions as reprinted above. First, of course, is the actual shape of the Moseley pixels. As mentioned above, these pixels do not taper "from the center to the extremes." Rather, they are rectangles with triangles on the ends. Secondly, the examiner's citation from Moseley covers two different embodiments, which are confused in the analysis. Column 12, lines 1-9 make up the end of a paragraph beginning on Column 11, line 63. This paragraph is directed to the embodiment shown in Figure 17, in which pixels are arranged as "pairs of overlapping columns... separated by continuous vertical black strips, such as 35, of the black mask 5." This paragraph continues (from column 11, line 67 to column 12, line 9) to state:

> This arrangement reduces cross-talk permeation while maintaining viewing freedom and maximizing display resolution. Cross-talk occurs because of light leaking into a viewing window from neighbouring regions. By providing a dark space 35 between the pairs of pixels, light leaks in from one side of the viewing window only. Also, the black mask areas can be used for the routing of conductors. By using the pixel shapes with the tabs divided between the adjacent pixels, the pixel areas are maintained equal, which is desirable for matched pixel capacitance in the display.

The next paragraph begins on line 10 of column 12, and describes the hexagonally shaped pixels of the next embodiment. The only advantage mentioned to the use of the triangular portions making up the ends of the hexagons is that "there is a constant vertical extent or aperture across the whole row including the overlapping triangular regions," which is a consistent theme with many of the embodiments of Moseley.

It is evident from a reading of Moseley that the hexagonally shaped pixels of Figure 18 did not provide any advantage with regard to reducing "unwanted light leaking through the viewing window from a neighboring window." Rather, it was the dark spaces 35 between the pixels of Figure 17 to which Moseley was referring. These pixels were clearly not hexagonal. Thus, the examiner's basis for assuming that one skilled in the art might modify the rectangular pixel cells of Nomura to be hexagonal appears to be unfounded.

Another fundamental premise of the examiner's rejection that appears misplaced is the reliance on the shape of the *pixels* of Moseley as a motivation for how one might change the shape of the *pixel regions* of Nomura. In reality, the shape of the pixels of Moseley has no relevance to the shape of the Nomura pixel regions. Moseley provides a number of embodiments for a spatial light modulator in which different pixel shapes are used. These different pixel shapes are stated as providing different advantages, but these advantages have to do with the organization and powering of individual pixels, not with the structure of cells within which multiple views are maintained. In short, the hexagonal shape of the pixels of Moseley has nothing to do with the hexagonal shape of the cells of the present invention.

The applicants' image is based on a cell structure that has been already been described at length. Each cell includes a plurality of interspersed views for the region of the image in which the cell is located, and is substantially hexagonal in shape. Moreover, as recited in independent Claims 38 and 43, each cell has a maximum height that is centered relative to the cell and the height tapers continuously to a minimum height at the extremes of the cell. It is this shape that allows the rows of cells to be staggered and nested with each other such that, as stated in the claims, "a maximum cell height in a first row aligns with a minimum cell height in an adjacent row." This nested configuration allows for a high density of image information in the vertical dimension, with minimal information loss from the tapered shape of the cells. As mentioned previously, the horizontal movement of a viewer's position is most often parallel to the image surface, and the distance from a viewer's eye to a particular cell (and its corresponding aperture) therefore increases as the viewing angle increases relative to an axis normal to the image surface. This reduces the portion of the image that can be seen through the aperture in question which, necessarily, is located near an extreme of the corresponding cell. Recognizing this fact, the applicants took advantage of this reduced viewing range near the edges of the cells to reduce the cell height at the extremes. The tapered shape to the cells resulted in no appreciable loss of viewable information, but allowed the cell rows to be nested together, as discussed above. By thus providing a denser arrangement of cells and, correspondingly, a denser arrangement of apertures, more overall information, and more overall light, is provided to the viewer as a result.

There is no suggestion in the prior art combination of Moselely and Nomura of a system having a cell configuration such as that recited in independent Claims 38 and 43. Since Claims 39-42 depend ultimately from Claim 38, and Claims 44-49 depend ultimately from Claim 43, these claims are equally unsuggested by the cited prior art combination. As such, reconsideration of Claims 38-49 under this ground for rejection is respectfully requested.

In addition to the prior art rejection discussed above (Moseley in view of Nomura), the examiner has made a different prior art rejection based on the same two references (albeit referring to it as obviousness over Nomura in view of Moseley). However, it is not clear how this rejection differs from the preceding one, since both reference the same sections of the two references and apparently recite the same motivation to combine. To the extent that this basis for rejection is understood, it is believed that the arguments above apply equally well to Nomura in view of Moseley as they do to Moseley in view of Nomura. In short, there is no suggestion whatsoever in the cited prior art combination of a system having an image made up of cells each of which provides a range of interspersed views for the region of the image in which the cell is located, and each of which has a maximum height at the center of the cell that tapers continuously to the extremes of the cell. These features are very clearly recited in each of independent Claims 38 and 43, and these claims are therefore unsuggested by the cited prior art combination. Claims 39-42 depend ultimately from Claim 38, and Claims 44-49 each depend ultimately from Claim 43, and these claims are therefore equally unsuggested by the cited prior art. Reconsideration of Claims 38-49 under this ground for rejection is therefore respectfully requested.

In light of the foregoing amendments and remarks, it is respectfully requested that all the claims be allowed such that the application may be passed to issue. The applicants' positions in support of the application and claims have been painstakingly described above so as to clearly establish the appropriateness of a finding of allowability. This lengthy response is offered as a *bona fide* attempt to advance the prosecution of this application, which has now been pending for over five years and has already been the subject of three requests for continuing examination. Should any questions remain as to the nature of the invention, the sufficiency of the disclosure or the content of the prior art, the applicants respectfully request an opportunity to discuss those issues with the examiner and, if the examiner so chooses, with the examiner's supervisor, as such involvement would seem appropriate given the pendency of the application. Any questions regarding this matter may be directed to the undersigned.

Respectfully submitted,

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